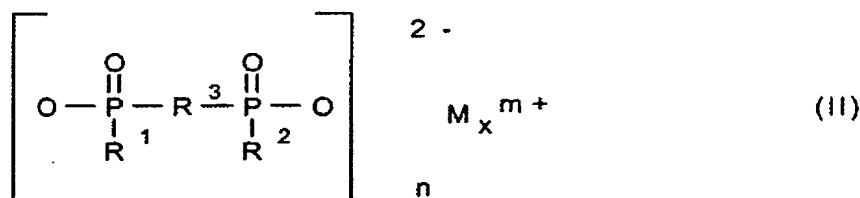
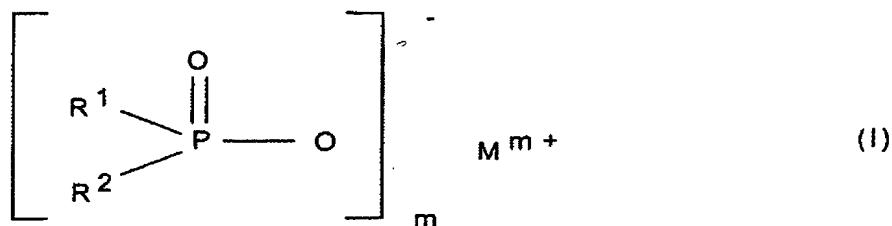


Patent claims

1. A flame-retardant thermoset composition which comprises, as flame retardant, at least one phosphinic salt of the formula (I) and/or a diphosphinic salt of the formula (II) and/or polymers of these



where

R^1, R^2 are identical or different and are $\text{C}_1\text{-}\text{C}_6$ -alkyl, linear or branched, and/or aryl;

R^3 is $\text{C}_1\text{-}\text{C}_{10}$ -alkylene, linear or branched, $\text{C}_6\text{-}\text{C}_{10}$ -arylene, -alkylarylene or -arylalkylene;

M is Mg, Ca, Al, Sb, Sn, Ge, Ti, Zn, Fe, Zr, Ce, Bi, Sr, Mn, Li, Na, K and/or a protonated nitrogen base;

m is from 1 to 4;

n is from 1 to 4; and

x is from 1 to 4,

and also at least one synergistic component from the substance class of the organic or inorganic phosphorus compounds, and at least one synergistic component from the substance class of the nitrogen compounds.

2. A flame-retardant thermoset composition as claimed in claim 1, wherein R¹ and R² are identical or different and are C₁-C₆-alkyl, linear or branched, and/or phenyl.
3. A flame-retardant thermoset composition as claimed in claim 1 or 2, wherein R¹ and R² are identical or different and are methyl, ethyl, n-propyl, isopropyl, n-butyl, tert-butyl, n-pentyl and/or phenyl.
4. A flame-retardant thermoset composition as claimed in one or more of claims 1 to 3, wherein R³ is methylene, ethylene, n-propylene, isopropylene, n-butylene, tert-butylene, n-pentylene, n-octylene or n-dodecylene.
5. A flame-retardant thermoset composition as claimed in one or more of claims 1 to 3, wherein R³ is phenylene or naphthylene.
6. A flame-retardant thermoset composition as claimed in one or more of claims 1 to 3, wherein R³ is methylphenylene, ethylphenylene, tert-butylphenylene, methylnaphthylene, ethylnaphthylene or tert-butynaphthylene.
7. A flame-retardant thermoset composition as claimed in one or more of claims 1 to 3, wherein R³ is phenylmethylene, phenylethylene, phenylpropylene or phenylbutylene.

8. A flame-retardant thermoset composition as claimed in one or more of claims 1 to 7, which comprises from 0.1 to 30 parts by weight of phosphinic salt of the formula (I) and/or a diphosphinic salt of the formula (II) and/or polymers of these, and from 0.1 to 100 parts by weight of an organic phosphorus compound, and from 0.1 to 100 parts by weight of a nitrogen compound, per 100 parts by weight of thermoset composition.
9. A flame-retardant thermoset composition as claimed in one or more of claims 1 to 8, which comprises from 1 to 15 parts by weight of phosphinic salt of the formula (I) and/or a diphosphinic salt of the formula (II) and/or polymers of these, and from 1 to 20 parts by weight of an organic phosphorus compound, and from 1 to 20 parts by weight of a nitrogen compound, per 100 parts by weight of thermoset composition.
10. A flame-retardant thermoset composition as claimed in one or more of claims 1 to 9, wherein the organic phosphorus compound is triethyl phosphate, triaryl phosphates, tetraphenyl resorcinaldiphosphate, dimethyl methylphosphonate, and/or its polymers with phosphorus pentoxide, phosphonate ester, (5-ethyl-2-methyl-dioxaphosphorinan-5-yl)methyl methyl methanephosphonate, phosphoric ester, pyrophosphoric ester, alkylphosphonic acids and/or oxalkylated derivatives of these.
11. A flame-retardant thermoset composition as claimed in one or more of claims 1 to 10, wherein the nitrogen compound is melamine, melamine derivatives of cyanuric acid, melamine derivatives of isocyanuric acid, melamine salts such as melamine phosphate, melamine polyphosphate or melamine diphosphate, dicyandiamide, or a guanidine compound, such as guanidine carbonate, guanidine phosphate, guanidine sulfate, and/or condensation products of ethyleneurea and formaldehyde, or ammonium polyphosphate.

12. A flame-retardant thermoset composition as claimed in one or more of claims 1 to 7, comprising from 0.1 to 15 parts by weight of phosphinic salt of the formula (I) and/or a diphosphinic salt of the formula (II) and/or polymers of these, and from 0.1 to 100 parts by weight of an inorganic phosphorus compound, and from 0.1 to 100 parts by weight of an nitrogen compound, per 100 parts by weight of thermoset composition.
13. A flame-retardant thermoset composition as claimed in one or more of claims 1 to 7, comprising from 1 to 15 parts by weight of phosphinic salt of the formula (I) and/or a diphosphinic salt of the formula (II) and/or polymers of these, and from 1 to 20 parts by weight of an inorganic phosphorus compound, and from 1 to 20 parts by weight of a nitrogen compound, per 100 parts by weight of thermoset composition.
14. A flame-retardant thermoset composition as claimed in one of more of claims 1 to 13, wherein the inorganic phosphorus compound is red phosphorus, ammonium phosphate and/or melamine polyphosphate.
15. A flame-retardant thermoset composition as claimed in one or more of claims 1 to 14, which also comprises carbodiimides.
16. A flame-retardant thermoset composition as claimed in one or more of claims 1 to 15, which is a molding composition, a coating or a laminate made from thermoset resins.
17. A flame-retardant thermoset composition as claimed in claim 16, wherein the thermoset resins are unsaturated polyester resins or epoxy resins.

18. A process for preparing flame-retardant thermoset compositions as claimed in one or more of claims 1 to 17, which comprises mixing a thermoset resin with a flame retardant made from phosphinic salt of the formula (I) and/or a diphosphinic salt of the formula (II) and/or polymers of these with at least one synergistic component from the substance class of the organic or inorganic phosphorus compounds and at least one synergistic component from the substance class of the nitrogen compounds, and wet-pressing (cold-pressing) the resultant mixture at pressures of from 3 to 10 bar and at temperatures of from 20 to 60°C.
19. The process for preparing flame-retardant thermoset compositions as claimed in one or more of claims 1 to 17, which comprises mixing a thermoset resin with a flame retardant made from phosphinic salt of the formula (I) and/or a diphosphinic salt of the formula (II) and/or polymers of these with at least one synergistic component from the organic or inorganic phosphorus compounds, and at least one synergistic component from the substance class of the nitrogen compounds, and wet-pressing (warm- or hot-pressing) the resultant mixture at pressures of from 3 to 10 bar and at temperatures of from 80 to 150°C.
20. The process for preparing flame-retardant thermoset compositions as claimed in one or more of claims 1 to 17, which comprises mixing a thermoset resin with a flame retardant made from phosphinic salt of the formula (I) and/or a diphosphinic salt of the formula (II) and/or polymers of these with at least one synergistic component from the substance class of the organic or inorganic phosphorus compounds, and at least one synergistic component from the substance class of the nitrogen compounds, and processing the resultant mixture at pressures of from 50 to 150 bar and at temperatures of from 140 to 160°C to give prepgs.